



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Singer et al.
Serial No.: 10/755,846
For: Illumination System With A Plurality Of Light Sources
Filed: January 12, 2004
Examiner: David A. Vanore
Art Unit: 2881
Confirmation No.: 8440
Customer No.: 27,623

Attorney Docket No.: 637.0003USQ

AMENDMENT

**Mail Stop RCE
COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450**

Dear Sir:

Applicants are submitting the present document with a Request for Continued Examination (RCE). Please amend the application as follows:

Amendments to Claims begin on page 2 of this paper.

Remarks begin on page 10 of this paper.

7. (currently amended) The illumination system of claim 5,
wherein said plurality of raster elements includes a first subset of said plurality of raster elements
in said first area, and
wherein said first subset of said plurality of raster elements receives light from said first
collecting optical element.

8. (currently amended) The illumination system of claim 7,
wherein said second light source includes a second collecting optical element, ~~and~~
wherein said plurality of raster elements includes a second subset of said plurality of raster
elements in said second area, and
wherein said second subset of said plurality of raster elements receives light from said second
collecting optical element.

9. (currently amended) The illumination system of claim ~~2~~ 1, wherein said optical element is a
first optical element, and said plurality of raster elements is a first plurality of raster
elements, and
wherein said illumination system further comprises a second optical element with a second
plurality of raster elements for receiving said plurality of light channels from said first
plurality of raster elements.

10. (original) The illumination system of claim 9,
wherein said first area includes a first subset of said first plurality of raster elements for
partitioning light from said first light source into a plurality of light channels,
wherein said second plurality of raster elements receives said plurality of light channels such that
a member of said first plurality raster elements and a member of said second plurality of
raster elements are each assigned to a member of said plurality of light channels, and
wherein said plurality of light channels is configured to provide an illumination pattern in an exit
pupil of said illumination system.

11. (original) The illumination system of claim 10, wherein said illumination pattern is in a shape selected from the group consisting of a circular shape and an annular shape.

12. (original) The illumination system of claim 10,
wherein said plurality of light channels is a first plurality of light channels, and said illumination pattern is a first illumination pattern,
wherein said second area includes a second subset of said first plurality of raster elements for partitioning light from said second light source into a second plurality of light channels,
wherein said second plurality of raster elements receives said first plurality of light channels in a first subset of said second plurality of raster elements, and receives said second plurality of light channels in a second subset of said second plurality of raster elements, such that a member of said second subset of said first plurality of raster elements and a member of said second subset of said second plurality of raster elements are each assigned to a member of said second plurality of light channels, and
wherein said second plurality of light channels is configured to provide a second illumination pattern in said exit pupil.

13. (original) The illumination system of claim 12, wherein said second illumination pattern is in a shape selected from the group consisting of a circular shape and an annular shape.

14. (original) The illumination system of claim 12, wherein said first illumination pattern has a shape that is different from that of said second illumination pattern.

15. (currently amended) The illumination system of claim ~~2~~1, wherein said first light source comprises a spectral filter.

16. (original) The illumination system of claim 15, wherein said second light source comprises a spectral filter.

17. (currently amended) The illumination system of claim-~~2~~1, wherein said first light source comprises a reflecting optical element.

18. (original) The illumination system of claim 17, wherein said second light source comprises a reflecting optical element.

19. (currently amended) The illumination system of claim-~~2~~1, wherein said first light source includes a first collector for collecting first light from a light emitter and focusing said first light to a first focus point, wherein said second light source includes a second collector for collecting second light from a light emitter and focusing said second light to a second focus point, and wherein said first focus point is at a position that is substantially identical to that of said second focus point.

20. (original) The illumination system of claim 19, wherein said first area and said second area are spatially separated from one another.

21. (original) The illumination system of claim 19, wherein said first area comprises a first plurality of first raster elements and said second area comprises a second plurality of first raster elements.

22. (original) The illumination system of claim 19, wherein said plurality of raster elements includes a first subset of said plurality of raster elements in said first area, in an arrangement adapted to said first collecting optical element.

23. (original) The illumination system of claim 22, wherein said plurality of raster elements includes a second subset of said plurality of raster elements in said second area, in an arrangement adapted to said second collecting optical element.

24. (original) The illumination system of claim 19,
wherein said optical element is a first optical element, and said plurality of raster elements is a
first plurality of raster elements, and
wherein said illumination system further comprises a second optical element with a second
plurality of raster elements for receiving said plurality of light channels from said first
plurality of raster elements.

25. (original) The illumination system of claim 24,
wherein said first area includes a first subset of said first plurality of raster elements for
partitioning light from said first light source into a plurality of light channels,
wherein said second plurality of raster elements receives said plurality of light channels, such that
a member of said first plurality raster elements and a member of said second plurality of
raster elements are each assigned to a member of said plurality of light channels, and
wherein said plurality of light channels is configured to provide an illumination pattern in an exit
pupil of said illumination system.

26. (original) The illumination system of claim 25, wherein said illumination pattern is in a shape
selected from the group consisting of a circular shape and an annular shape.

27. (original) The illumination system of claim 25,
wherein said plurality of light channels is a first plurality of light channels, and said illumination
pattern is a first illumination pattern,
wherein said second area includes a second subset of said first plurality of raster elements for
partitioning light from said second light source into a second plurality of light channels,
wherein said second plurality of raster elements receives said first plurality of light channels in a
first subset of said second plurality of raster elements, and receives said second plurality of
light channels in a second subset of said second plurality of raster elements, such that a
member of said second subset of said first plurality of raster elements and a member of said

second subset of said second plurality of raster elements are each assigned to a member of said second plurality of light channels, and
wherein said second plurality of light channels is configured to provide a second illumination pattern in said exit pupil.

28. (original) The illumination system of claim 27, wherein said second illumination pattern is in a shape selected from the group consisting of a circular shape and an annular shape.

29. (original) The illumination system of claim 27, wherein said first illumination pattern has a shape that is different from that of said second illumination pattern.

30. (original) The illumination system of claim 19, wherein said first collecting optical element has a shape selected from the group consisting of a cylindrical shape and an elliptic shape.

31. (original) The illumination system of claim 30, wherein said second collecting optical element has a shape selected from the group consisting of a cylindrical shape and an elliptic shape.

32. (currently amended) An projection exposure apparatus, comprising:
a plane for accommodating a mask;
the illumination system of claim-21, for illuminating said mask;
a carrier system for accommodating a light-sensitive object; and
a projection objective lens for imaging said mask on said light-sensitive object.

33. (currently amended) A light source device comprising:
a first light source for emitting a first light bundle having a wavelength ≤ 193 nm;
a second light source for emitting a second light bundle having a wavelength ≤ 193 nm; and
an optical unit having a first plurality of raster elements that includes at least three raster elements, for ~~redirecting each of~~ reflecting said first and second light bundles to produce a combined light bundle.

34. (original) The light source device of claim 33, further comprising an optical element having a second plurality of raster elements for focusing one of said first and second light bundles onto said optical unit.

35. (currently amended) The light source device of claim 34,
wherein said combined light bundle is directed to an optical device for illuminating a field in an image plane,
wherein said optical device includes a third plurality of raster elements, and
wherein said first, second and third plurality of raster elements each contain the same number of raster elements.

36. (currently amended) A projection exposure apparatus, comprising:
a plane for accommodating a mask;
an illumination system that includes (a) a first light source for emitting a first light bundle having a wavelength ≤ 193 nm, (b) a second light source for emitting a second light bundle having a wavelength ≤ 193 nm, and (c) an optical unit having ~~a plurality of raster elements~~ at least three raster elements, ~~for redirecting each of~~ reflecting said first and second light bundles to produce a combined light bundle for illuminating said mask;
a carrier system for accommodating a light-sensitive object; and
a projection objective lens for imaging said mask on said light sensitive object.

37. (previously presented) The projection exposure apparatus of claim 36,
wherein said first light source is operated under a first operating condition and said second light source is operated under a second operating condition, and wherein said first operating condition is different from said second operating condition.

38. (previously presented) The projection exposure apparatus of claim 36,

wherein said first light bundle includes a first light beam, and said second light bundle includes a second light beam, and
wherein said first and said second light beams are incoherently superimposed to reduce a degree of coherence of said illumination system.

39. (currently amended) A method comprising:

~~combining~~reflecting a first light bundle having a wavelength ≤ 193 nm, and a second light bundle having a wavelength ≤ 193 nm, by an optical component having at least three raster elements, to produce a combined light bundle;
illuminating a mask with said combined light bundle; and
imaging said mask onto a light sensitive object to produce a microelectronic component.

40. (currently amended) A projection exposure apparatus, comprising:

a first light source for emitting a first light bundle having a wavelength ≤ 193 nm;
a second light source for emitting a second light bundle having a wavelength ≤ 193 nm; and
an optical element having at least three raster elements, for collecting~~and~~, condensing and reflecting said~~light~~ first and second light bundles to produce a combined light bundle to illuminate a reticle in an area to expose a pattern on a substrate.

41. (currently amended) A projection exposure apparatus, comprising:

a first light source for emitting light having a first wavelength ≤ 193 nm;
a second light source emitting light having a second wavelength ≤ 193 nm; and
an optical unit having at least three raster elements, for~~combining~~ reflecting said light from said first and second light sources, to produce a combined light bundle,
wherein said first wavelength is different from said second wavelength.